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BELL, BOYD & LLOYD, LLC P. O. BOX 1135 CHICAGO, IL 60690-1135			MALKOWSKI, KENNETH J	
			ART UNIT	PAPER NUMBER
			2613	

DATE MAILED: 04/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/070,603

Applicant(s)

NOE, REINHOLD

Examiner

Kenneth J. Malkowski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 32-63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 32-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 6,130,766 to Cao et al. in view of U.S. Patent No. 6,714,742 to Hayee et al.

With respect to claims 32 and 47, Cao discloses a system for optical information transmission (column 3 lines 8-11) having differently polarized optical signal elements (column 3 lines 19-23 (principal states of polarization)), comprising: a controllable polarizing element (column 1 lines 55-56) Figure 1 (22) for emitting at least one of the optical signal elements on an output side Figure 1 (24, 29); at least one signal processing module (column 6 line 32 (digital signal processing unit)) Figure 1 (30) for detecting any interference occurring between the optical signal elements (column 6 lines 30-40). However, Cao differs from the claimed invention in that the signal elements are not split into 2 separate channels and polarization multiplexed, rather Cao has the signal elements (polarization elements) contained in the same channel (column 1 lines 35-37 (two polarization modes for a single mode fiber)). Hayee, from the same field of endeavor discloses polarization-division multiplexing in digital optical communication devices and systems (column 1 lines 8-11). Hayee recognizes that signal elements

(polarization elements of an optical signal) can be either contained in a single channel as is taught by Cao, or in a multiple channel multiplexing format (column 2 lines 20-42 (a carrier wavelength can be represented by a combination of polarization components, and conversely can be contained in two coherent optical waves))(column 1 lines 49-53). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use polarization multiplexing for multiplexing two signal elements as taught by Hayee into the polarization interference detection system as taught by Cao. Hayee teaches that having polarization signal elements in two separate channels and multiplexed as opposed to containing the polarization elements in a single waveguide as taught by Cao is advantageous. The motivation for polarization multiplexing would have been to increase data transmission capacity (Hayee: column 1 lines 19-26 and 37-45). Furthermore, Cao suggests his polarization interference detection system and method could be implemented with several wavelengths rather than a single wavelength so that one PMD compensator could handle multiple wavelengths, which would inherently include multiplexing (Cao: column 10 lines 21-26).

With respect to claims 33 and 48, Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 32, further comprising, in the at least one signal processing module Cao: Figure 1 (30)(Cao: DSP control unit), at least one regulator Cao: Figure 1 (28) having at least one input-side control signal Cao: Figure 1 (27) at an input of the regulator, and at least one output-side control signal at an output of the regulator, the output-side control signal being passed by the regulator to the controllable polarizing element Cao: Figure 1 (22). Applicant describes regulators

as elements wherein control signals assume minimum magnitudes to ensure optimum receiver operation (Cao: page 11 lines 8-11 of applicants specification). Cao teaches the driver Cao: Figure 1 (28) also is controlled in such a way so as to minimize the amplitude of the control signal entering the controllable polarizing element Cao: Figure 1 (22) (Cao: column 8 lines 48-59).

With respect to claims 34-35 and 49-50 Cao in view of Hayes discloses a system for optical transmission as claimed in claim 32, further comprising, in the controllable polarizing element Cao: Figure 1 (24), a controllable polarization transformer (applicant describes a controllable polarization transformer as a PMD compensator on page 7 lines 28-30 of applicants' specification)(column 1 lines 55-57) followed by a fixed polarizing element Cao: Figure 1 (24)(polarization beam splitter)(Cao: column 3 lines 38-56).

With respect to claims 36-37 and 51-53 Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 32, further comprising a phase-difference modulating device for producing differential phase modulation between signal elements (Cao: column 2 lines 30-33)(Cao: column 1 lines 60-65)(Cao: column 6 lines 26-40 (wherein the input side control signal is not associated with a steady state difference phase angle)).

With respect to claims 38 and 54 Cao in view of Hayes discloses a system for optical transmission as claimed in claim 36, further comprising a transmission laser and a transmission-end power splitter Cao: Figure 1 (24), wherein the phase-difference modulating device produces frequency modulation on the transmission laser (Cao:

column 6 lines 26-40 (frequency of the transmitted optical signal is associated with each principal state of polarization which is altered by the phase difference modulating device)), and produces the differential phase modulation between the optical signal elements based on a magnitude of any delay time difference between a splitting of an optical from the transmission laser in the transmission-end power splitter Cao: Figure 2 (incoming line called "from PBS 24" enters block 30a)) and combination with orthogonal polarizations of the optical signal elements formed in this way (Cao: column 3 lines 8-31).

With respect to claims 39 and 55, Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 32, further comprising at least one photo detector following the controllable polarizing element Cao: Figure 2 (68), wherein a signal component which is emitted on the output side of the controllable polarizing element is supplied to an input side of the at least one photo detector Cao: Figure 2 (68), the at least one photo detector producing at least one detected signal in which interference is manifested (Cao: column 7 lines 1-8).

With respect to claims 40 and 56, Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 39, further comprising a filter in the at least one signal which can be processed and is produced from the at least one detected signal (Cao: column 8 lines 6-17).

With respect to claims 41-43 and 57-59, Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 39, further comprising a detector Cao: Figure 2 (60,68) in the at least one signal processing module Cao: Figure

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1 (30) Figure 2 (30a) which at least partially provides the input-side control signal Figure 2 which is one of a linear function and a splitter root function of at least one second-order moment of at least one spectral signal element (Cao: column 3 lines 23-27 (wherein two spectral elements, the first and second PSP's are linearly polarized)). Furthermore, because a second-order moment is a measure of power of the spectral component, Cao teaches discloses a detector that fulfills such a requirement (Cao: column 7 lines 1-8).

With respect to claims 44 and 60, Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 40, wherein the filter passes a Fourier coefficient of a signal Cao: Figure 2 (Cao: column 8 lines 4-21)(Cao: column 8 lines 31-36 (wherein A from $A \cdot \sin(2\omega t + \theta)$ is a Fourier coefficient)), which can be processed, as a spectral signal element Cao: Figure 1 (30), Cao: Figure 2 (30a)(Cao: column 8 lines 25-30) in which case delay time compensation can be effected before formation of second moments in mixed form (Cao: column 8 lines 26-55 (the process of implementing a DSP algorithm)).

With respect to claims 45 and 61, Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 40, wherein the at least one signal processing module Cao: Figure 1 (30), Cao: Figure 2 (30a) processes the at least one detected signal Cao: Figure 2 (from TAP 20 and from PBS 24) and emits an output-side control signal which drives Cao: Figure 2 (27) an output side polarization transformer in the controllable polarizing element Cao: Figure 1 (22)

With respect to claims 46 and 62, Cao in view of Hayes discloses a system for optical information transmission as claimed in claim 40, further comprising a correlating element in the at least one signal processing module, the correlating element for correlating the at least one detected signal with at least one spectral component of at least one data output signal (Cao: column 2 lines 3-5), and for emitting a correlation signal which can be processed, such that the at least one signal processing module processes the correlation signal Cao: Figure 2 (Cao: column 4 lines 37-40) and emits and output side control signal Cao: Figure 1 (27) for driving an input-side polarization transformer Cao: Figure 1 (27) in the controllable polarizing element (Cao: column 3 lines 8-37).

Response to Arguments

3. Applicant's arguments with respect to claims 32-62 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to polarization related transmission systems in general:

U.S. Patent No. 6,104,515 is cited to show a method and apparatus for providing high-order polarization mode dispersion compensation using temporal imaging

U.S. Patent No. 6,901,225 is cited to show a device for detecting polarization mode dispersions

U.S. Patent No. 6,714,742 is cited to show a polarization-division multiplexing based on power encoding of different polarization channels

U.S. Patent No. 5,822,100 is cited to show a method and system for equalizing PMD using incremental delay switching

"Measurement of Differential Group Delay in Installed Optical fibers Using Polarization Multiplexed Solitons," IEEE Photonics Letters Vol. 11 No. 5 May 1999

U.S. Patent No. 6,509,985 is cited to show polarization multiplexing on parallel fiber-optic lines with skew adjustment for crosstalk between said lines

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Malkowski whose telephone number is (571) 272-5505. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER
